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1989

SERIE RESEARCH MEMORANDA

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Researchmemorandum 1989-58 augustus 1989

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SOME MAJOR ISSUES IN REGIONAL LABOUR MARKET ANALYSIS

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1. Introduction

Although there is a substantial body of literature on labour market analysis, most of it ignores the spatial dimension of the labour market. A spatial perspective in analysing labour market processes is important for several reasons (see Fischer 1986). First, labour markets are by no means as homogeneous as conventional labour market theories assume. In reality, labour markets are segmented by firm, industry, job type, worker type, occupation and - last but not least - spatial location. In other words, the macro pattern of labour market segmentation is reflected in a spatial segmentation. For instance, weak spatial labour markets are characterised by a high concentration of problem groups on the labour market as well as by a tendency to structural unemployment. The fact that labour markets are spatially segmented raises also important policy issues. Second, most countries are displaying strong spatial variations in the dynamics of unemployment. Certain regions (e.g. peripheral ones, old industrial areas and increasingly also inner cities) are more seriously suffering from unemployment problems than others. There are spatial inequalities, not only in terms of unemployment rates, but also in the range of quality of jobs available. The poor spatial coordination of labour supply and labour demand has recently become an important policy issue (see Clark 1983b). Third, geographical space exerts a frictional effect on labour market adjustment processes. Frictions of distance and resulting problems of market coordination and information may lead to a less efficient allocation of labour and to structural imbalances on some labour markets (see Ballard and Clark 1981). Fourth, the spatial distribution of job loss induced by economic restructuring and adjustment processes contrasts with that of new job creation, because of geographic differences in seedbed conditions for new firms.

Especially in an era of national economic stagnation, spatial discontinuities on the labour market are significant sources of inefficiency because spatial mismatches between the demand for and the supply of labour contribute to higher overall national unemployment. Up to now, relatively little is known about the operation and interaction of spatial labour markets. But a deeper theoretical and empirical understanding of spatial labour markets is a

prerequisite for public policy aiming at promoting more efficient spatial labour market coordination and allocation.

The general idea underlying regional labour market research is that spatial disaggregation of the labour market provides additional insight into the observed labour market behaviour, by both identifying the various internal forces operating within individual regional labour markets and revealing the external forces which are transmitted between different spatial labour markets via various economic, social and institutional-political linkages (see also Martin 1981b). Thus, as a fist analytical issue the definition and delineation of a spatial or regional labour market is of central importance.

Definitions in the literature on demarcation principles for a spatial or regional labour market vary considerably. Usually the regional labour market is defined as a region within which there is a clear labour market pattern defined by the spatial range of employment opportunities open to a worker without changing his place of residence. Evidently, this spatial range is affected by income, by transport access, commuter time and the extent of knowledge on alternative employment opportunities. From the viewpoint of the employer the spatial labour market may be defined as the spatial area which contains those (potential) members of the labour force a firm can - theoretically considered - attract (see Lever 1980). Clearly, these two perspectives do not necessarily lead to an unambiguous result.

Even though there is no single definition which is universally appropriate for all types of regional labour market analysis, three criteria seem to be important as elements of a more general definition of a regional labour market: journey-to-work, the market's employment opportunities and the accessibility to market information about job openings, actual and potential future wages, etc. Based upon these criteria, a regional labour may then be defined to be a spatially delineated area which fulfils the following boundary requirements (cf. also Hart 1981):

* Daily journey-to-work across the boundary is insignificant.
* The pecuniary and non-pecuniary commuting and migration costs within the boundary of the region are significantly less than those between this region and any other region of the economy.
* Firms are located in those places where they can obtain the major proportion of their potential labour supply within the boundary.

* Although information about job openings and wages is imperfect, for the intra-regional labour force the search costs within the region are significantly less than those for searching in an alternative region.

Although in practice researchers are tempted to use regional delineations on the basis of available statistical information, it is noteworthy that the decision and demarcation on the design of a spatial framework is a crucial element in multiregional labour market modelling. Surprisingly, relatively little research has been done on this topic up to now. One of the rare exceptions are multiregional labour supply modelling efforts for Austria undertaken by Baumann et. al. (1983, 1988). In principle, there are two fundamental approaches to the regionalisation problem: the disjoint functional regionalisation, and the nondisjoint (overlappling) functional regionalisation approach. In the first case the basic spatial units of the study area are aggregated to form disjoint regional labour markets. There are several powerful numerical procedures available which use commuting flows between the basic spatial units as starting points and identify regional labour markets in such a way that cross-commuting is minimized (see Baumann et al. 1983). The second approach leads to a non-disjoint regionalisation framework where transition zones can be taken into account (see Baumann et al. 1988). These two studies illustrate that the performance of multiregional labour market models may critically be dependent on the choice of an appropriate spatial framework and of the relative size of the labour market region. This means that it is by no means admissible to ignore possible effects of the choice of a spatial demarcation in multiregional labour market modelling. In the case of forecasting, additionally the question of the stability of a system of spatial labour markets defined on the basis of commuting flows may arise because commuting flows tend to change over time due to changes in the transport systems and other factors.

In the past few years regional labour market analysis has received increasing attention by economic geographers and regional economists. A central question dealt with is the distribution of employment (unemployment, vacancies) and wages over a system of regional labour markets. In particular, the existence and determinants of employment and wage income disparities in space have received a great deal of attention. A substantial part of labour market research is policy-oriented focussing on attempts to equalise regional unemployment and to receive intraregional equilibrium in the sense of low and stable unemployment rates (see Oosterhaven und Folmer 1985).

Broadly considered, three types of research streams may be distinguished in the field of spatial labour market research. The first concerns labour supply issues, migration and job search behaviour (see Section 2). The second refers to the determinants of labour demand, where the major focus is on actual and likely future employment effects of spatial structural economic and broader technological changes (see Section 3). Finally, the third type deals with the spatial dimensions of the unemployment problem (see Section 4). These three types of spatial labour market research will be briefly discussed in the sequel from a non-technical point of view.

2. Labour Supply Issues

Regional labour supply issues deal with the structure and change of labour supply, spatial dimensions of job search, commuting within and migration between regional labour markets.

2.1. General Aspects

Labour supply analysis can in principle refer to a variety of different phenomena, for instance, having a job or not (i.e. labour force participation - a binary decision), hours worked per week or year (a continuous decision) etc. (see Heckman et al. 1981 and Schubert et al. 1987 for more details on this issue). In a regional labour market context labour supply is usually defined as the sum of the regional labour force and net commuting (see Schubert 1982).

Various new evolutions are taking place in regional labour markets, e.g. demographic trends, labour force participation changes, a higher rate of self-employed, a higher skill level, and an increase in part-time jobs. Changes in participation rates and changes in net migration cause a dynamic evolution in the regional labour force. The most significant impact on regional labour supply in advanced economies in recent years has been the result of both changes in the size of the population of working age due to demographic factors and changes in participation behaviour. High birth rates in the 1950s and early 1960s resulted in large numbers of young people entering the labour force in the late 1970s and early 1980s whereas the number of people approaching retirement age was relatively low. Much more important, however, was the rapidly increasing labour force participation of females, especially of married females. The rise in participation rates has been accompanied by two other important changes in female activity over the life cycle: a decline in the proportion of women responsible for the care of young children and an increase in the number of women

carrying the double burden of professional (often part-time work in the service sector) and child-rearing responsibilities. Consequently, a higher proportion of the female workforce is building up long periods of continuous labour market experience, and thus is able to establish and maintain higher skill levels. Over the past two decades, women have made considerable progress in entering the labour market in most industrialised countries. However, there are still significant differences between female participation in various countries (e.g., Sweden vis-a-vis Poland), whilst even within a country there are significant differences (see Fischer and Nijkamp 1987).

2.2. Labour Force Participation

Characteristically, spatial analysis has used either cross-section data (often disaggregated by age and sex) in a multiregional setting in order to reveal spatial variations in labour market participation behaviour or time series data in a single region context in order to evaluate the response of regional labour force to short run and long run changes in labour market conditions. Income variables (market wages and non-labour income), monetary costs (such as, e.g., commuting costs), attributes reflecting the uncertainty about the chances to obtain a job and/or preferences between income and leisure are usually included as major determinants of labour force participation.

There are fundamental differences in participation rates between sexes, especially between married men and women. Spatial variations in male participation rates tend to be rather small and may be explainable in terms of the age structure, concentrations of retirement migrants ond social class differences in level of education. In analysing spatial disparities, studies of female participation often describe patterns of association between participation rates and indicators of local opportunites for women's employment. The existence of stronger constraints on spatial mobility for women workers evidently implies that their employment status is more likely to depend on circumstances in specific spatial labour markets (see Gordon and Molho 1985).

2.3. Migration

In the field of migration analysis there exists a large body of literature. For a long time, migration research war rather descriptive in nature, focusing on the following three questions: who moves, why do they move, and where do they move. In the recent past there has been a change in research focus to a less descriptive and a more analytic approach and

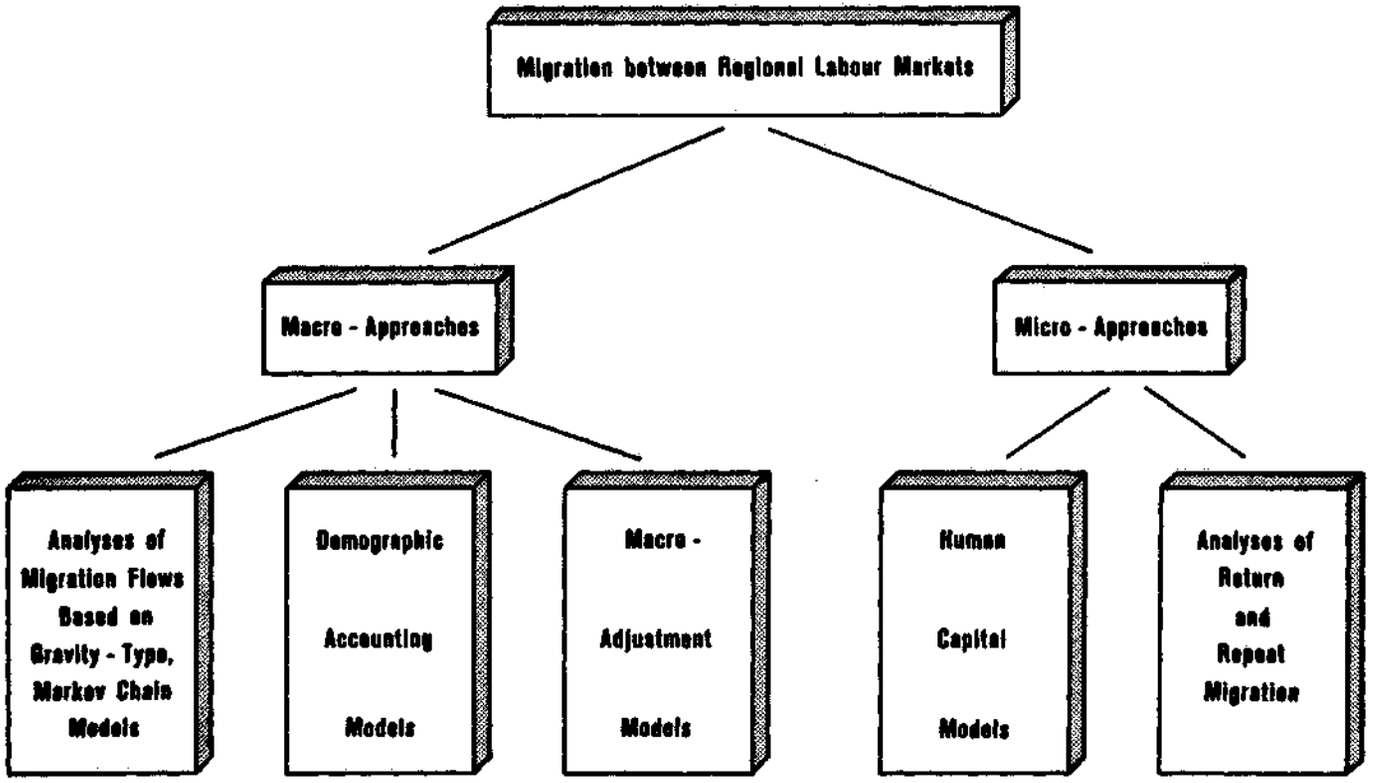

Figure 1. The Structure of Interregional Migration Research
(Source: Clark 1982, p. 11)

to a greater concern with the linkage of migration to housing markets, labour markets educational facilities and access (see Clark 1982).

In a labour marketcontext the concern is only with migration of the economically active population, so that wage differentials and job opportunities play an important role. Most of the theoretical and empirical work on mobility and migration of labour has been concerned with interregional migration. It is clear that research on interregional migration is rather diversified; it may pertain to different socio-economic groups, to different types of regions, etc. One important analytical distinction which will be made here concerns the level of aggregation. Broadly speaking, two approaches may be distinguished: macro-approaches and micro-approaches (see figure 1).

Macro-Approaches

Three major lines of inquiry may be distinguished at the macro-level. First, there is a continuing concern with the analysis of migration flows based on gravity-type or entropy maximizing models, Markov chain models (MacKinnon 1975, Rogerson 1979) and simple statistical analysis of the structure of migration flows including inter alia the work by Slater 1976 and Tobler 1981. Such studies are usually descriptive rather than explanatory in nature.

A second stream of macro-research has utilized a demographic accounting framework. This type of research is concerned with population change. But of course migration is a central component in the framework. Prominent examples are provided by Rogerson (1980) and Wilson and Rees (1977). In the context of demographic models there is also increasing attention for life-cycle migration (see e.g. Van Wissen and Rima, 1988).

A third line of inquiry at the macro-level deals with explanations, either in terms of economic and amenity explanations or in terms of macro-adjustment models. Macro-adjustment models view migration essentially as an equilibrating mechanism which optimally allocates demand and supply of labour over the regional labour markets in the long run, and thus equalizes the regional wage rates. This neoclassical view implies that workers will migrate out of low wage, high unemployment regional labour markets and move to high wage, low unemployment regional labour markets. The majority of empirical analyses dealing with labour migration adopts this perspective and characterizes migration as an economic push-pull process, where regional wages and employment characteristics are considered to be key

determinants. But the underlying assumptions of perfect information, labour homogeneity and zero transaction costs are heroic and conflict with the reality of decision making (see Fischer and Nijkamp 1987c). Moreover, empirical evidence does not always support this hypothesis. Evidence from American and European studies suggests that regional in-migration rates often behave as predicted by theory, but for out-migration rates there tends to be either no significant spatial variation or the variation is in contrast with prior expectation. Very little research has been done up to now in analysing the temporal dynamics of gross migration. The question whether out-migration lags in-migration or whether out- and in-migration are closely synchronised in time is still an unresolved question (see Clark 1983 c).

In the recent past, it has been increasingly realised that models of labour migration have to take into account behavioural factors and constraints which influence the migration decision. Distance, information about job offers, skill constraints and home ownership (especially where the house is located in a depressed regional labour market) tend to be the major constraints whereas economic conditions, demographic characteristics and quality of life aspects usually play an important role in creating migration flows.

Two competing approaches available to analyse the labour migrant departure process enable an explanation of why out-migration rates may be high in the case of fast growing spatial labour markets. These approaches refer to the processes of heterogeneity and non-stationarity which both result in the same macro result in terms of gross migration flows. The heterogeneity approach suggests that different internally homogeneous categories show variations in the propensity to move. The non-stationarity approach is often integrated into mobility models in the form of the concept of cumulative inertia which suggests that the propensity to move declines with increasing duration of residence at a specific location (Gleave and Sellens 1984). An example may be found in Hyman (1974) who presents a migration model in which migration decisions are characterised by both types of processes and moreover by past memories of individual migrations and personal histories. These latter aspects are especially important in the case of migration related to internal labour market adjustment processes.

Micro-Approaches

Within the class of micro - or individual - oriented approaches two broad topics may be distinguished, viz. human capital models, and repeat and return migration.

The human capital approach postulates a relationship in which human capital investment (especially in education and on-the-job-training) results in higher wage rates, because in a competitive labour market workers are paid according to their marginal productivity and they increase their productivity by undertaking human capital investments. The theory predicts that in the long run, wage differentials between occupations in a competitive labour market will depend on the training required and will be just sufficient to compensate for the costs of this investment.

Human capital models of migration consider migration as an investment to increase the productivity of human resources. The model of migration originally suggested by Sjaastad (1962) and modified later on in several ways assumes that an individual chooses migration as a strategy if the expected benefits exceed the costs of migration. Bedause the benefits of migration can only accrue over a period of time which renders migration an investment it can be considered as an investment in human capital. It is worthwhile to mention that benefits and costs of migration are not limited to economic variables (Clark 1982). This human capital approach suggests that an individual responds to the present value of net gain which is given as the difference between the expected utility of destinations k and l minus the costs incurred of moving from k to l, summed over the expected length of the remaining lifetime adjusted by the discount rate where the discount rate reflects uncertainty about the future. In other words an individual will choose destination l when the present value of the net gain from migrating from k to l is greater than any other destination (Clark 1982).

This approach has received a great deal of attention in the past but has been criticised too because of the difficulty involved in operationalising the concept of life time earnings. The human capital model approach has been also extended to consider migrants who repeat their primary migration by moving again and others who repeat their migration and return to their initial location. DaVanzo and Morrison (1981) argue that the prospective migrant can be viewed from the concept of location-specific capital (such as, e.g., home ownership) in the case of repeat migration and from the concept of imperfect inormation in the case of return migration (for a more detailed discussion see Clark 1982).

2.4. Commuting

So far much less attention has been paid to modelling commuting change which is the second imporant spatial labour market adjustment process. The models usually rely on gravity concepts. Moreover, commuting and labour migration have usually been analysed

separately. One of the exceptions dealing with these two types of labour supply mobility in an integrated framework is given in Evers and van der Veen (1985). This study is also worth mentioning because it uses an aggregated nested multinomial logit approach to model several choices involving workplace and residential location (see also Fischer and Maier 1986 in this context).

Another interesting example is contained in Gordon and Molho's (1985) model of the operation of female labour markets in the London metropolitan region which links migrational flows, changes in commuting, changes in unemployment and participation rates, new house construction and house price changes. The results obtained confirm that for all economically active females (both married and unmarried women) there tends to be significantly lower levels of inter-area mobility than for their male counterparts. In the study of commuting flows restricted female commuting fields were identified. In particular, the growth in part-time employment by married females tends to shorten the commuting radius of such workers.

Finally, it has to be added that there is also a link between the increase in labour force participation and the commuting radius, especially in case of multi-worker households. A new job of one of the members of the family in a new place does often not lead to a migration, but rather to an increase in commuting distance. This interwoven connetion would certainly deserve further investigation.

2.5. Occupational Mobility

Also the relationship between occupational mobility and migration needs further investigation. Up to now, there are only few studies focussing on this link. Gleave's rather detailed analysis of labour mobility in the mid 1970s is one of the exceptions. This study has shown that the labour force tends to be polarised. A higher than expected proportion of workers are either non-mobile or both geographically and occupationally mobile. Semi-skilled and unskilled workers display low rates of migration, but high rates of occupational mobility (see Gleave 1983). Especially in case of short-cycle employment (e.g., in the tourist sector) the throughflow my be very high.

In analysing occupational mobility over the period 1966-1975 in the US, Rosenberg found - according to Gleave and Sellens (1984) - that occupational mobility is associated with upward social mobility at a time of unemployment expansion and thus enables many workers to move from the secondary to the primary labour market. In times of recession, however,

market conditions impose downward mobility. It is interesting to mention that younger workers who achieve upward mobility are more likely to sustain this attainment than older workers. This points to the fact that young workers are often underprivileged in the labour makret primarily as a consequence of their age and not because they are disproportionately characterised by less satisfactory attributes.

2.6. Job Search

In recent years there has been an explosion in the amount of research undertaken in the area of job search. Economic search models attempt to characterise worker's behaviour by assuming that the worker collects job information in an optimal manner. This evidently depends on the objectives of the worker and the environment in which he operates. The latter includes aspects such as the distribution of wage offers, the costs of search, knowledge of market conditions, the contracting terms, etc. On the basis of objectives and constraints, job search behaviour can be modelled. Most formal search models limit the job search to a single characteristic, namely the wage rate which is usually considered to be constant over time and restrict the degree of uncertainty involved in the search process. The actual job offer is, for example, considered to contain complete information about layoff risks, career prospects, working conditions, etc. (see Burdett and Mortenson 1980). Moreover, the models generally suppress risk aversion and assume that individuals making a job search attempt to maximise their expected income net of search costs (see e.g. Parsons 1975, Lippman and McCall 1976, for an overview). Up to now, present labour market search models have only partially succeeded in capturing distinctive aspects of the labour market, mainly due to the restrictive or unrealistic assumptions made. It is for instance often assumed that the labour market is atomistic in nature, characterised by the optimising behaviour of firms and workers, and constrained only by imperfect information. In particular, the simplified treatment of information and uncertainty is a crucial failure of many existing job search models. First, individuals are not necessarily equally well informed about job openings, wages, etc. Potential jobs, for example, may be found through informal social networks. Second, information concerning the availability of jobs, their wages, skill requirements and location is spatially biased towards the spatial core of the labour market and tends to filter down to the periphery.

Only quite recently attempts have been made to develop spatial models of search. Most of the spatial models of search introduce space as a component of the search process and link job search theory and migration theory (for an overview see Miron 1978 and Rogerson

1982). In these models some fundamental assumptions on the sequence of job search, the job acceptance and the migration decision have to be made. For example, David (1974) assumes that migration is a prerequisite for job search in a spatial labour market different from that in which the home of residence is located. In order to analyse migration behaviour more realistically, it would be necessary to consider both possibilities, the possibility of migration prior to search and also the possibility of a successful long distance search without prior migration.

Rogerson and MacKinnon (1981) examine the effects of search and migration, but at a very high level of aggregation. All jobs are assumed to be identical and all workers to have identical skills. The migration decision is based on perceived job vacancy distributions. Amrhein and MacKinnon (1985) relax these homogeneity assumptions. The refined multiregional job search and migration model assigns workers with heterogeneous skills in a Pareto optimal fashion to various jobs in each of the spatial labour markets. No effort, however, is made to take job tenure and career related aspects into account. The model does not approach the individual level of decision making, but does approach an intermediate scale of aggregation of different categories of jobs and workers.

This model and most other spatial models of job search and migration assume market competition of imperfect information in order to explain why spatial mismatches occur (see, for example, Curry 1985). In outlining an alternative job search theory where notions of contract theory play a central role Clark (1987) argues that in the present job search models the notion of information is not taken seriously enough. Information is not only imperfect about job openings and wage offers, but also indeterminate.

Moreover, in most search models, the competititve aspects of job search are neglected. Mattson and Weibull´s (1981) attempt to model the intraurban job search process as a function of market competition and job accessibility belongs to the very few exceptions. This work is also worth mentioning because it both combines a search-theoretic perspective as such with the multinomial logit approach and presents an interesting empirical test using a sample of 600 job openings in the Stockholm region (see Rogerson 1987 for more details). The empirical results obtained underline that competition may show a strong and uneven effect on job searcher´s prospects.

Up to now, there has been only little research into actual job search behaviour. Much more work needs to be done to get deeper insights into the ways the volume, pattern and

efficiency of actual job search activity are shaped and affected by different spatial labour market conditions (see also Martin 1986).

3. Labour Demand Issues

The second major type of regional labour market research, viz. the analysis of the determinants of the demand side, is much less developed. The major focus here is on the analysis of actual or likely future employment effects of regional economic and technological changes, changes in market positions of firms etc.

3.1. General Aspects

The dynamics of firms has been studied quite thoroughly in industrial economics. Especially in recent years there has been considerable interest in structural changes, caused amongst others by innovations and reflected amongst others in the rapid rise of the business service sector and of small and medium size enterprises (see also Giaoutzi et al. 1988).

The relationship between technological change and the labour market is a complex one which cannot be adequately analysed at the macro level. Research in this area is therefore increasingly directed towards both the meso-scale of spatial labour markets and sectors, and the micro-scale of firms. Cities and regions are affected in different ways by new techologies, depending upon their locational profile, their manpower potential and other aspects of the labour market concerned.

In general, a distinction has to be made between product and process innovations. The first class tends to be oriented towards large agglomerations and hence various R & D and skilled labour in central areas. The latter class in often found in peripheral and/or intermediate areas and is usually more related to routine-types of labour force (see Davelaar 1989).

Technological change in a spatial context has three different major aspects, the generation of new technologies, their diffusion patterns and their socio-economic impacts (see Stoneman, 1984).. These aspects will be briefly discussed (for more details see Gillespie 1983, Nijkamp 1988a).

3.2. Generation of New Technologies

The generation of a new technology refers basically to the invention of a new product, production system or management at a specific location. Central in the discussion in this context is the breeding place or incubator hypothesis which states that large (especially metropolitan) agglomerations - through their diversified labour markets, their accessibility as nodes on a spatial network and their flexible industrial structure - may act as the seedbeds for technological innovations (see e.g. Andersson and Johansson 1984b, Davelaar 1989). In this framework, innovation may be seen - in accordance with Piatier (1984) - as covering a succession of operations, i.e. the transition from the idea to its materialisation, followed by a result (i.e. the product itself or one of its inputs or the method of its production, etc.).

According to this view, a metropolitan region has potentially a comparative advantage as a place of introducing new economic activities. Naturally, this advantage can be lost over time. Malecki (1983), for example, presents empirical evidence that many large cities have lost their innovative potential while medium sized cities which are not too far away from large cities, exhibit a boom process due to the design and use of new technologies (see also Storper 1986).

Technology diffusion is the subsequent application of an innovation after its initial commercialisation. It includes adoption by other users as well as more extensive use by the original innovation. Moreover, it encompasses all the actions at the level of the firm or organisation taken to exploit the economic benefits of the innovation. Most of the economic benefits of new technologies come from the diffusion rather than the development of the technology.

3.3. Diffusion of New Technologies

The diffusion and adoption of new technologies is an important issue in economic geography and regional economics. Diffusion processes of new phenomena have both a temporal and a geographical dimension. In a temporal context, the cumulative pattern of adoption of a new technology usually conforms quite closely to a cumulative normal distribution function of a S-shaped (logistic) curve, while the spatial distribution at a certain point in time may be considered as a result of an expansion or hierarchical diffusion process or a combination of both types. Various factors such as e.g. the technical applicability and profitability of the invention, the availability of physical and human capital, management

attitudes as well as size, structure and organisation of the potential adopter, market pressures for diffusion and the regional selection environment (the presence or absence of a stimulating and innovative entrepreneurial climate) influence the speed of diffusion in time and space. Diffusion and adoption of innovation is of crucial importance for regional growth, because regions that lag behind in terms of adoption tend to face increased problems of industrial decline.

Product and process diffusion have often been studied at the establishment level in terms of the characteristics of the innovation and of the adopter of the innovation. Only few studies have taken account of both the temporal and the spatial dimension of the diffusion process. A notable exception is the study of regional innovation levels in Great Britain undertaken by the Centre for Urban and Regional Development Studies, University of Newcastle upon Tyne. This study involved a national questionnaire survey of 807 establishments and looked in more detail at rates of adoption (defined as the introduction of a new or improved product to factories in the period 1973-1977) in three subsectors of the electronics and mechanical engineering industry (scientific and industrial instruments, metalworking machine tools, radio and electronic components) in the UK (see Thwaites et al. 1981, Oakey et al. 1982).

This micro-oriented study indicates spatial variations in the establishment acceptance of product innovations, to the advantage of the South East of the UK and to the detriment of the peripheral areas. Moreover, the study shows a strong association between location, size and ownership of establishments and innovation and reveals the importance of R&D efforts on the factory site for innovations. The group of firms which have severely low rates of product innovations are single plant independent firms in development regions which more likely reflect the less favourable economic environmental influences than all other industrial plants in the same area. Thus, the results of this study imply that regional industrial environments influence the level of product innovation in manufacturing firms.

Process innovations (e.g. computerised controlled machine tools, the incorporation of microprocessors in products and production processes) do not reveal the same degree of spatial variations. Multisite organisations do not disproportionately influence the pattern of regional parity in process innovation levels (see Thwaites et al. 1982, Oakey et al. 1982). The studies undertaken by the Centre for Urban and Regional Development Studies illustrate that interesting insights into the relationship between technological change, industrial dynamics and regional development can be achieved by this type of research.

3.4. Effects of New Technologies

The effects of technological change are multidimensional in nature. They range from locational and environmental impacts to labour market effects. There is a considerable debate about the effects of technological change on employment. In particular, the debate has focussed on the consequence of the new information technologies, i.e. all new technologies related to the storage, processing, communication and dissemination of information. Also the issue whether these new technologies strenghten geographical concentration of economic activities or on the contrary, encourage decentralisation has attracted many studies (see for a survey, Giaoutzi and Nijkamp 1987 and, for a characterization of the micro-electronic revolution and its impact on labour and employment, Fischer 1988b).

A key feature of these micro-electronics based technologies is their pervasiveness in generating a whole range of new applications over a wide range of sectors. This pervasiveness is induced by other features such as a dramatic decline in costs of transmitting, storing and processing information; a new capability to integrate and control industrial and service activities; a reduction in the time-lag between inventions and (commercial) innovations compared to earlier technologies; and a large potential for productivity increase in relation to all factor inputs. All these characteristics shape the impact on employment and its structure. The introduction of these new technologies creates imbalances of various kinds, and sets in motion an adaptation process which affects not only the number of jobs, but also their distribution by occupation, industry and region.

The factual impact of new technologies on overall employment in different regional sectors is hard to assess with great precision. There are serious methodological flaws involved in identifying and measuring employment implications. First, there is an analytical problem of isolating employment effects induced by the introduction of a new technology from effects resulting from all other changes taking place at the same time. A second major difficulty refers to the choice of an appropriate methodological approach for measuring the effects. The case study approach neglects any compensating effect and thus overstates the negative effects of technological change while the introduction of new products and services is by and large ignored in partial or general equilibrium approaches which moreover lack the detailed information obtained by micro-approaches. Finally, there are significant technical problems of quantifying employment effects of new technologies because of inadequacies in industrial and occupational statistics. In spite of these problems there is a wide range of studies in

several countries which have attempted to assess and to forecast the impacts on employment and labour (see Fischer 1988b for a more detailed survey).

All these studies show more or less severe methodological deficiencies. Most ignore the productivity effects on inputs other than labour. Only few take explicitly the international dimensions of the technological change-employment relationship into account. Relatively little attention is given to the factors influencing the speed and patterns of appplication of new technologies. The overall impact on employment in any particular country, however, depends crucially on the domestic rate of diffusion. The slower the new technologies diffuse relative to other countries, the more likely it is that other countries will gain a permanent advantage via the indirect employment effects.

Most studies devote a great deal of effort to identifying direct effects, especially the negative implications induced by process innovations. There have been only few attempts to assess the importance of compensating effects. Especially price and income effects are rarely taken into account. These shortcomings certainly do not arise from a lack of understanding the factors and the dynamic nature of the technological change-employment relationship, but are associated with the methodological and statistical problems mentioned above (see Brainard and Fullgrabe 1986). The few studies addressing the issue of current employment effects at the macro-level tend to agree in that employment and unemployment levels in recent years were not significantly influenced by technological change (see, e.g., the OECD (1982) report on the effects of micro-electronics, robotics and jobs based on studies from thirteen countries). Shifts in demand patterns, international competition and economic growth patterns appeared to be much more important (Fischer 1988b).

In the long run the impact of the new technologies on overall employment crucially depends on the question whether these technologies raise the productive potential of national (and regional) economies and provide a basis for sustained growth in output, employment and income. But the extent to which potential growth becomes translated into actual growth of output, employment and income is not solely determined by technological change, but is depending also upon factors such as the overall rate of economic growth, the degree of adaptability at the enterprise level, the flexibility in product and factor markets, industrial relations systems, education and training, trade and investment across countries.

Quite recently, increasing attention is being paid not only to quantitative, but also to qualitative effects of new technologies on employment, such as changes in occupational

structure, changes in work tasks, job skills and the work environment. The impact on the overall occupational distribution of jobs is also difficult to assess due to several reasons. Changes in job content that do occur do not get quickly reflected in job titles. On the other hand job titles may change while the content of work may remain the same. Moreover, there are other changes in the sectoral mix which may be quantitatively more important.

Particular emphasis is often placed on the upskilling-deskilling issue (see also the discussion on the Braverman deskilling hypothesis). Some studies have noted a deskilling effect of micro-electronics based technologies or both a deskilling effect in some and an upskilling effect in other industries. Especially occupations which are largely involved in simpler information processing tasks (e.g. stenography, typing, filing) are predominantly vulnerable to displacement. On the other hand, there is no doubt that new information technologies will generally lead to an increasing demand for higher-level skills of programmers, engineers and maintenance personnel. Up to now, however, not very much is known about the restructuring of occupational hierarchies and skill requirements. The same is true with respect to effects on the informal sector and on the household economies. Especially regionally discriminating effects of such developments have unsatisfactorily been studied.

4. Regional Unemployment Disparities: Causes and Dynamics

The third major area in current regional labour market research refers to the causes and dynamics of regional unemployment disparities. This type of labour market research has received increasing attention in geography and regional economics in the recent past for at least two reasons. First, most advanced economies have been experiencing very high rates of unemployment because of a combination of global recession in demand for goods and services, a lack of international competitiveness, problems of adjustment of structural change, and shifts in labour supply. Second, these countries have displayed sharp spatial variations in unemployment. On the one hand, those regional economies specialising in depressed sectors such as shipbuilding, coal, steel, textiles, and with older manufacturing cities have faced severe adjustment difficulties in the light of deindustrialisation, with consequent high levels of unemployment. On the other hand, some of the more diversified cities and their metropolitan regions have enjoyed a substantial expansion of new jobs mainly in service industries, but also in manufacturing. Regional fluctuations, however, reflect not only spatial variations in rates of job creation and job redundancy, but also

changes in the occupational structure of labour demand and supply, as well as in commuting and migration patterns (see Gleave 1987).

Shifts on regional labour markets are thus often non-uniform, whilst they are also influenced by the reward system of labour. The reward system is not the result of anonymous market forces, but of institutional actions. For instance, the efficiency wage hypothesis provides an explanation for the existence of an equilibrium wage above the market clearing wage level (see Yellen 1984), a situation which may even differ for different regions.

Furthermore, it is noteworthy that not only the level of unemployment may differ for various regions in an economy, but also the duration of unemployment (see Gorter et al. 1989). Moreover, the timing of unemployment response in regional labour markets is an important component to analyse links between public policies, changing regional economic structure, and resulting variations in unemployment characteristics. Typically the studies analyse the relationship between national and regional unemployment in general and the lead/lag structure of unemployment response in particular by means of exploratory statistical analysis. If a region consistently reacts earlier than others it is usually termed a leading region, whereas conversely, if a region regularly reacts later than other regions or the national average, then it is described as a lagging region. The study of the spatial distribution of such leads and lags is well developed.

The classical approach to analyse the relationship between national and regional unemployment is a basic descriptive model put forward by Brechling (1967) and subsequently used in a wide variety of settings and at different spatial scales (see, for example, King et. al.1972, Jeffrey 1974, King and Clark 1978, Frost and Spence 1981). This approach measures the behaviour of individual regions relative to the national series and is based upon a regressional framework involving a set of time regressions in which the regional unemployment rate is related to structural, cyclical and seasonal components of unemployment.

This methodological approach has been used extensively in the past (see, for example, King and Clark 1978, Frost and Spence 1981) and with some confidence in its ability to identify relationships between national and regional unemployment. But its adequacy and efficacy has been questioned more recently. In particular, criticism has focussed on two major shortcomings. First, the implicit assumption of a symmetry in the lead-lag relationship has been criticised (see Johnston 1983). This assumption implies that if a region leads the

nation into a depression then it will also lead it out and if a region lags into the depression then it will also lag in the recovery stage. This assumption built in the classical mode of analysis is unwarranted both from a theoretical and an empirical point of view. The second objection refers to the fact that in nearly all applications the assumption of non-autoregression is violated. The presence of serial autocorrelation among the error terms has several serious implications. Even if the least squares estimates are unbiased in this case, they are likely to be inefficient. Moreover, the estimated variances seriously underestimate the true variances. The estimated variances, however, play an important role in constructing confidence intervals, testing hypotheses and computing t-ratios. Thus, even though the estimated parameters appear to be quite reliable (small variances) they are in fact extremely unreliable in the case of serially correlated errors. All these reasons suggest that generalization concerning the patterns of national and regional unemployment relationships based upon the classical mode of analysis may be spurious (for more details see Fischer and Petz 1988).

In response to these problems and deficiencies of the classical mode of analysis an alternative mode of analysis has been put forward by Clark (1979) and more recently by Fischer and Petz (1988): the transfer function-noise model approach. This alternative mode of analysis (see figure 2) shows some very attractive features. It can be used to describe a wide range of types of non-stationarity, seasonality and dynamic lag structure and to analyse the dynamic (or lagged) relationship by means of more general lag and error structures. The approach is not only more flexible in terms of identifying the relationships between national and regional unemployment in comparison with the classical mode. It also provides a great deal of flexibility in terms of characterizing the process which might be responsible for the autocorrelation among the error terms (for more details see Fischer and Petz 1988).

Several studies have revealed the existence of response-time differences in several countries. Most of them are exploratory in nature, but very few attempts have been made to relate them to the economic mechanisms which cause them. An explanation of the more or less persistent differences among regional unemployment rates is one of the greatest challenges to regional scientists, since conventional theory of long run regional labour market behaviour predicts that labour flows would adjust to and, thus, eliminate such differences. In the (geographic) literature, at least three types of hypotheses are used to explain regional differentials in unemployment and the timing of business cycles at the spatial labour market level. The first one relates regional industry structure to regional performance (see e.g., Thirlwall 1966, and Brechling 1967). The second hypothesis

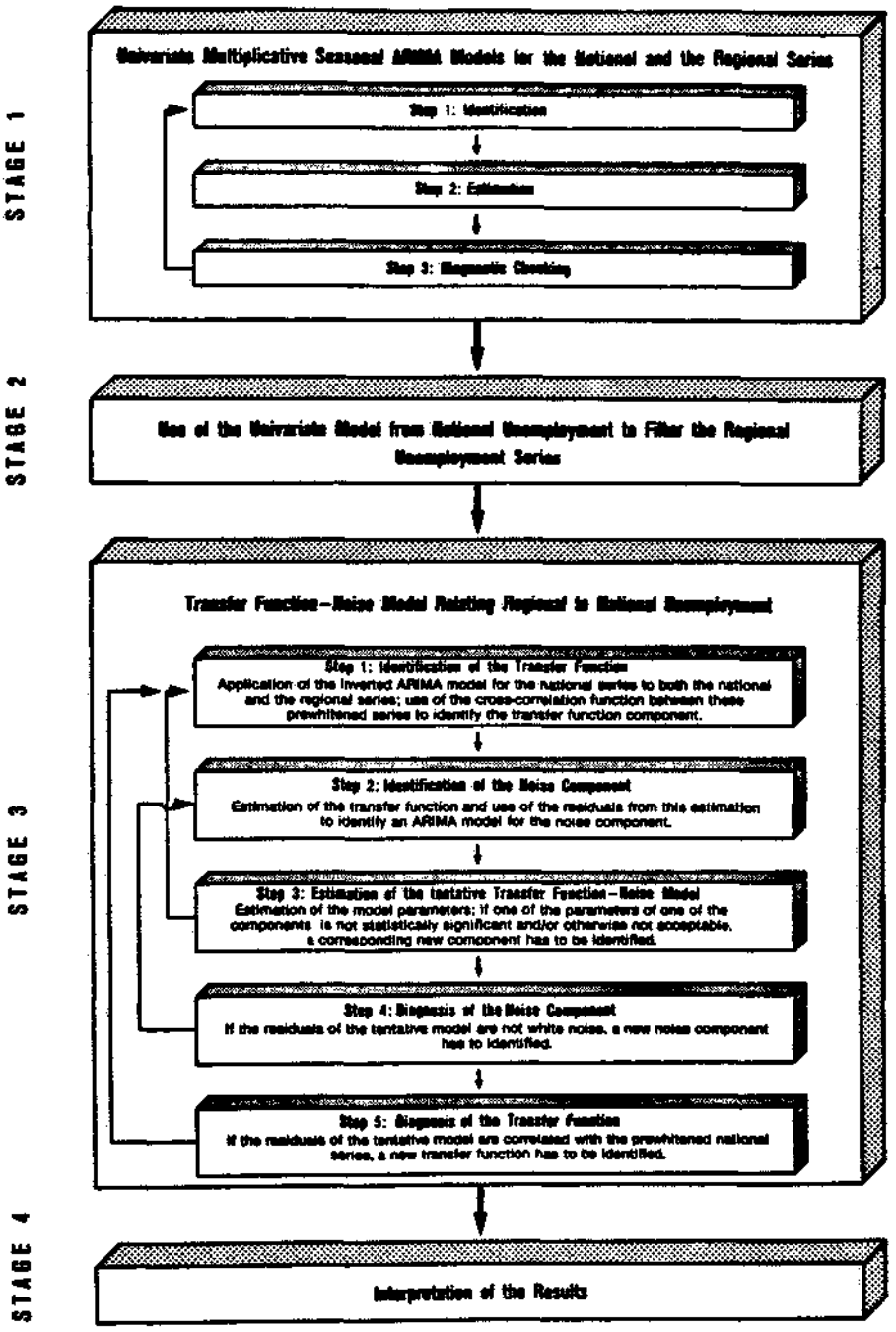

Figure 2. The Transfer Function-Noise Model Approach to Analysing the Relationship between National and Regional Unemployment (Fischer and Petz 1988)

concerns a hierarchical effect (i.e. the hierarchical diffusion process) in which the level of unemployment and the timing of changes is related to the position of the regions concerned in the spatial hierarchy and the level of integration of the regions in the national economy. Hereby it is assumed that changes in the demand for labour are transmitted through the system with lags where upturns in the economy will occur first in large cities and later in the smaller cities. King et al. (1969), for example, draw heavily upon the basis of central place and growth pole theory to establish and interpret the transmission of economic impulses from higher to lower order places in both time and space. The third hypothesis focusses upon a structural effect in which some industries lead or lag the national trend, and upon the employment structure of the spatial labour markets concerned.

In the regional economic literature different schools of thought on the subject of regional unemployment disparities can be found. One school argues that aggregate demand pressures are unevenly diffused across the space economy. Consequently, persistent regional differentials are considered to reflect differences in demand for products and labour. Another school of thought on this issue basically argues that regional unemployment disparities derive from a basic dualism between capital and labour and the segmentation of the labour market. The emergence and persistence of regions of high unemployment is considered to be the result of an historical process in which the spatial division of labour plays an essential role. These different point of views indicate the range of factors around which conceptual and empirical research has been developing. Up to now, however, there is no thing such as a fully formulated theory of spatial labour market adjustment.

Another important area in which significant contributions have been made to the debate on regional unemployment refers to the wage-unemployment relationship, especially in the context of the validity of the so-called Phillips-curve. Geographical work in this area is largely concentrated on the empirical analysis of this relationship in specific regional labour markets. Much empirical evidence has been provided to suggest that the regional variation in wages within advanced economies has much more to do with the industry mix of regions, the pressure of demand in the labour market, the spread of multiplant companies paying the same wages across the country, the degree of unionisation and the national wage bargaining process than with regional variations of unemployment (see Martin 1981c).

Very recently, increasing emphasis has been laid on the wage-change interdependence among regional labour markets. The most widely used approach in such studies has been to postulate the regional wage leadership hypothesis. This hypothesis states that wage

increases achieved by workers in one or more leading regions effectively determine the rate of wage change in the rest of the economy. Leading regions have usually been defined as those which experience the greatest labour demand pressures (lowest unemployment) and/or the highest wage (or wage changes) (see Martin 1981c). Martin (1981c) reviewing several conceptual and empirical formulations of this hypothesis points to the necessity to define the concept of a leading region on a much wider range of labour market characteristics including institutional and structural aspects.

Finally, it is worth mentioning that the spatial wage interdependence can influence the degree and direction of the impact of economic policy and labour market policy measures.

5. Outlook

This survey has been designed to cover briefly some of the current major interests and issues of research, from a non-technical point of view in contrast to other recent essays in the field (see Isserman et al. 1986, and Schubert et al. 1987). This field appears to be a rapidly expanding area and to offer a rich potential for new research.

Nevertheless it is at the same time necessary to emphasize that the nature and operation of regional labour markets can not be satisfactorily analysed in isolation from the broader working and performance of the economy and its macro-social context. The political, social and economic problems associated with the dysfunction of the labour market owe several of their causes to spatial aspects as well as to factors outside the national control. In this respect, spatial research and cross-national comparisons like those reported in Fischer and Nijkamp (1987a) are extremely important. As institutional aspects are more or less invariant within countries, the impact of institutional factors on regional labour markets can only be effectively analysed by cross-national comparative studies.

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